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## Long Term Surface Salinity Measurements

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### LONG-TERM GOALS

Our long-term goal is to establish a reliable system for monitoring surface salinity around the global ocean. Salinity has a great influence on air-sea interaction and is believed to have potential for improving climate forecasts if an observation system can be developed.

### OBJECTIVES

This project seeks to develop a new internal field conductivity cell that can be protected from biological fouling for two years. Combined with a temperature sensor, this foul-proof cell can be deployed widely on surface drifters. A reliable *in-situ* network of surface salinity sensors will be an important adjunct to the planned salinity sensing satellite to be deployed by NASA in a few years.

### APPROACH AND WORK PLAN

A new internal-field conductivity cell has been developed by N Brown, along with new electronics. This sensor system has been combined with a temperature sensor to make a conductivity – temperature (C/T) sensor suitable for deployment on drifters. The basic sensor concepts have been proven on a high resolution CTD. A simpler (lower cost) circuit has been designed for this application. A protection mechanism for the conductivity cell that includes antifouling protection has also been designed. Mr. A. Walsh of our commercial partner E-Paint has designed time-release formulations of antifoulants for our application. Mr. G. Williams of partner Clearwater Instrumentation is advising on power and communication issues for deployment of these sensors on surface drifters. This year we are running the performance tests on the new sensors.

### WORK COMPLETED

The conductivity cell has been constructed in ceramic and has been incorporated into a rotating shutter mechanism that isolates the cell from biological fouling (Figure 1). The electronic circuitry has been constructed and extensively tested for stability and noise characteristics. Antifoulants “pads” for this sensor have been delivered by partner E-Paint, after extensive testing for optimal antifouling

performance. Field testing of the completed sensors is about to commence at the WHOI dock, in order to catch this year's spring bloom. Different opening/closing/sampling schedules will be tested on the three units constructed to date.

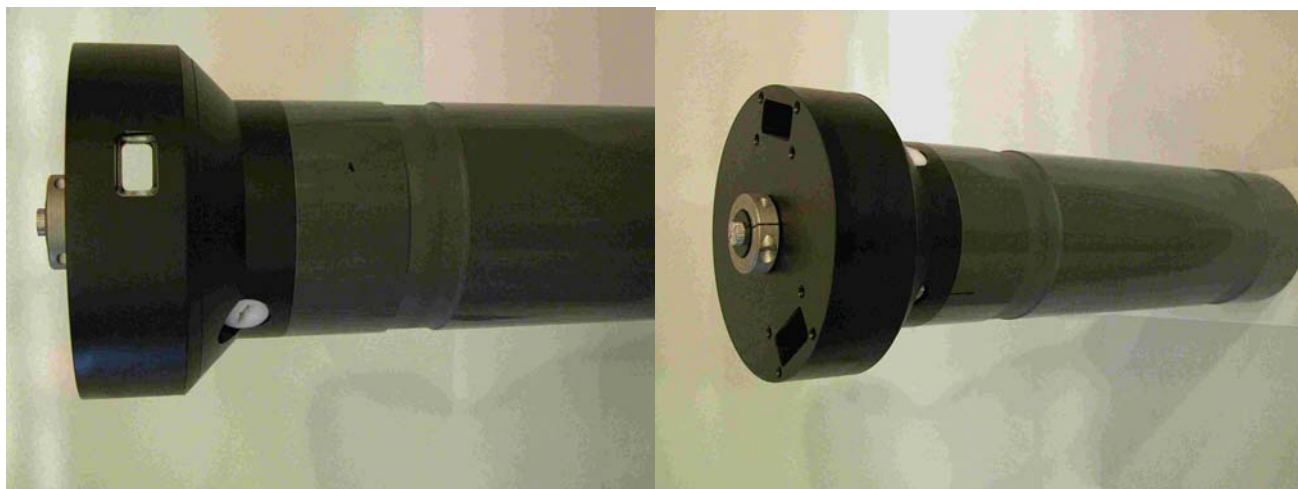


Figure 1.a, 1.b. The protected cell conductivity-temperature sensor. The left panel shows the open passage to the conductivity cell; the right panel shows a closed shutter system with the ports for the antifouling pads in view.

## **RESULTS**

The new rotating shutter mechanism appears to work well, though extensive tests in seawater have yet to be made. The electronic circuitry has proven to be very stable. This year's tests will tell us how long the antifouling formulations can keep the unit free of fouling.

## **IMPACT AND APPLICATIONS**

### **Economic Development**

The development and widespread deployment of a stable salinity sensor for the upper ocean will lead to an improved understanding of the role of the oceans in the climate system. Theory tells us that this implies improved predictability of decadal climate change, which would have tremendous societal benefits.

### **Quality of Life**

Sea surface salinity is a direct indicator of changes in the global water cycle, which is the major climate change issue of concern to society. It is also a key factor in the potential for abrupt climate change due to collapse of the thermohaline circulation. A better understanding of climate and improved climate forecasts would impact farming and fisheries, and greatly improve planning for water use and energy demand.

## **TRANSITIONS**

### **Economic Development**

It is expected that the new sensor, once completed, will be transitioned to a commercial product by licensing to an appropriate manufacturer.

### **RELATED PROJECTS**

None.